Open Access

International Journal of Agricultural and Applied Sciences, June 2020, 1(1): 49-51
https://www.agetds.com/ijaas
ISSN: 2582-8053
https://doi.org/10.52804/ijaas2020.1111

Research Article

Time of sowing affect the yield attributes, yield and Economics of wheat (*Triticum aestivum* L.)

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(Received: 30/04/2020**; Revised:** 15/05/2020**; Accepted:** 10/06/2020**)**

ABSTRACT

The field experiment was carried out at KrishiVigyan Kendra, Aurangabad and at farmers' field during rabi seasons of 2013-14 and 2014-15, to response of time of sowing affect the yield attributes, Yield and Economics of wheat (*Triticum aestivum* L.). Experiment was laid out in a completely randomized block design with 4date of sowing i.e5th November, 15th November 25th November, 5thDecemberin a total of five replications duringrabi 2013-14 and 2014-15. Significantly maximum grain yield (44.64 q/ha) recorded with wheat sown at 5th November being at par with 15th November both were significantly more over 25th November and 5th December. 6.13%, 3.70% more grain yield recorded with at 5th November and 15th November produces over sowing of wheat at 25th November and 33.65% and30.59% more grain yield over 5th December, respectively. Sowing of wheat at 5th November produced more straw yield (52.90q/ha) being at par with 15th November and they were significantly more over 25th November and 5th December. Straw yield recorded 8.49%, 7.51% more with at 5th November and 15th November produces more straw yield over 25th November and 15.96% and14.91% more straw yield over 5th December Sowing of wheat. Significantly highest B-C ratio was also recorded with 5thNovember and statically at par with 15th November over 25th November and 5th December. Highest return 6.13 and 3.71% & by 33.65% & 30.60%, respectively higher returns by were recorded when wheat sown at 5th November and 15th November over 25th November and 5th December respectively.
Keywords: Terminal heat stress, wheat, Time of sowing

INTRODUCTION

Wheat is one of the most staple foods of the humanity (Meena *et al*., 2013). Its area and productivity is increasing rapidly adopting across the globe, due to its wider adaptability sustainability under divers agro climatic conditions (Kumar *et al*., 2014). However, considerable portion of the wheat grown in South Asia is considered to be affected by heat stress, of which the majority is present in India (Joshi *et al*., 2007a). Joshi *et al*., 2007a reported that terminal heat stress is a major reason of yield decline in wheat due to delayed planting in India. Singh *et al*., 2008 also state that selection of suitable crop varieties according to the agro climatic conditions may play crucial role in realizing the optimum production of any crop commodity. The most heat-stressed locations of South Asia are the Eastern Gangetic Plains (EGP), central and peninsular India, whereas heat stress is considered moderate in north western parts of the Indio-Gangetic Plains (IGP) (Joshi *et al*., 2007b). Late planting of wheat suffers drastic yield losses which may exceed to 40-50%. Global climate models reported that increase in mean ambient temperature between 1.8 and 5.8^{o}C) by end of this century (IPCC, 2007. Grain yield was negatively related to the thermal time accumulated above the base temperature of 310C (Mian*et al*., 2007). High temperature above 32 ^{0}C has been reported reducing grain yield and grain weight (Wardlaw*et al*., 2002). Shriveled small grains are produced and different yield associated traits such as tillering, grain weight and grains numbers/spike are reduced. Using this factor (3–4 % loss per 10C above 15–20 ^{0}C), it can be calculated that most commercially sown wheat cultivars in India would lose approximately 50 % of their yield potential when exposed to 32–38^{0}C temperature at the crucial grain formation stage. The experiment was conducted

at the at KrishiVigyan Kendra, Aurangabad and farmers of Aurangabad district during the years *rabi* 2013-14 and 2014-15. By the late sowing the vaieties was given high temperature stress during grain filling stage in comparison to timely sown condition.

MATERIALS AND METHOD

The field experiment was conducted at KrishiVigyan Kendra and farmers' field in Aurangabad district of Bihar during the two consecutive rabi seasons of 2013-14 and 2014-15. The experimental site was allocated at Aurangabad district at 332'above mean sea level and 24^{0}.50' N and 84^{0}.70' E. The maximum temperature remained above 35.60°C and 35.97°C during 2013-14 and 2014-15, respectively. At crop period total rainfall received was 10.77 and 13.25 mm during 2013-14 and 2014-15, respectively The soil was clay-loam having normal soil reaction (pH 7.5), low in organic carbon (0.51%) and available nitrogen (205.7 kg/ha), and medium in available phosphorus (19.3 kg/ha) and available potassium (198.5 kg/ha). The experiment was laid out in completely randomized block design with 5 replications comprising of 4 date of sowing i.e. 5^{th}November, 15^{th} November 25^{th}November ,5^{th} December . In experimental plots, wheat was established by with zero-till drill (ZTD),. The wheat variety HD-2733was tested in different dates of sowing. To allow drill to place seeds at a uniform distance and proper depth the fields were leveled with leveler at the time of sowing of all the replications. Before sowing with zero-till drill the experimental plots meant for zero-till drill (ZTD) sowing were subjected to two ploughing followed by harrowing and planking (ZTD).Experimental field was fertilized at the rate of 120:60:40 kg NPK/ha. Nitrogen was applied in three splits (1/2dose of N at basal rest1/2dose each equal at Ist irrigation and 2^{nd} irrigation), while the entire P_2O_5 and K_2O were applied as basal application. Pendimethalin was sprayed within 1days after sowing, by knap-sack sprayer using 800 litres/ha water in all treatment plots in all replications. Metsalfuron @ 33g/ha as Post-emergence herbicides was applied with knap-sack sprayer fitted with flat-fan nozzle using 500 l/ha of water at 25-30 days after sowing (DAS) in all treatment plots in each replications. The data on plant height, number of tillers, crop biomass and number of grains/spike were recorded. The crop was harvested manually in the second week of April. Variable cost of cultivation and gross returns were calculated on the basis of existing price of the inputs and outputs.

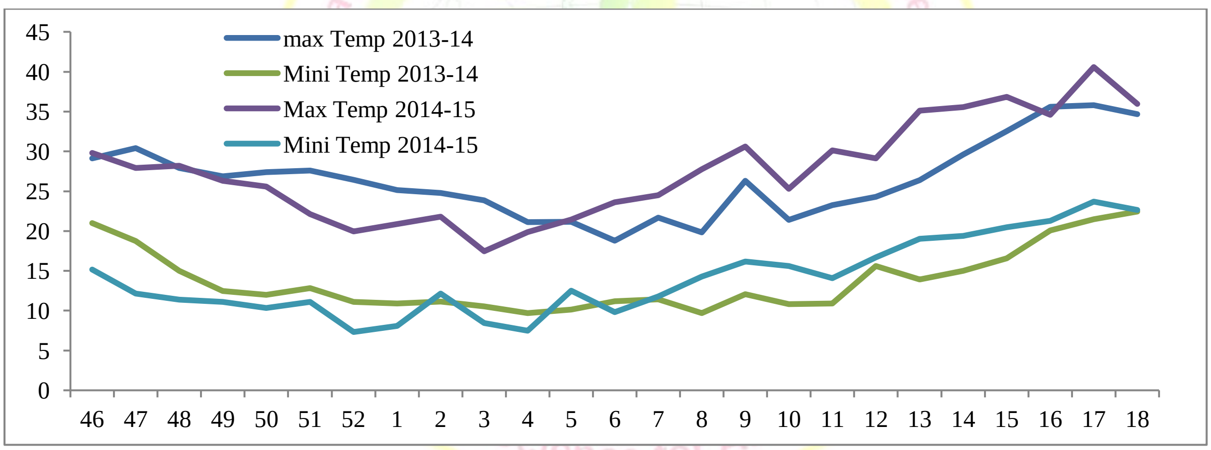

Fig1: Maximum and Minimum Temperature during crop period 2013-14 and 2014-15

RESULTS AND DISCUSSION

Number of effective tillers/m^2, spike length, grains/spike and test-weight was significantly influenced by different date of sowing. Number of effective tillers/m^2 at harvest stage recorded maximum with wheat sown at5^{th} November being at par with 15^{th} November both were significantly higher over 25^{th} November and 5^{th} December. Spike length was recorded significantly higher with wheat sown at 5^{th} November over other treatment. Number of grain significantly influenced by date of sowing maximum number of grain/spike was recorded with when wheat was sown at 5^{th} November over 15^{th} November, 25^{th} November and 5^{th} December. 1000 grain weight was also significantly influenced by date of sowing.Maximum1000grain weight recorded with wheat sown at 5^{th} November being at par with 15^{th} November they were significantly higher over 25^{th} November and 5^{th} December (Table1).

Table1: Effect of date of sowing on yield and yield attributes and yield on wheat (Pooled data of two years)

Treatment	No. of effective tillers/ m^2	Length of Spike (cm)	No of grain/ spike	1000 grain Weight (g)	Grain yield (q/ha)	Straw yield (q/ha)
T_1- 5 November	334.20	9.54	48.40	44.56	44.64	52.90
T_2 –15 November	318.20	9.13	44.80	45.06	43.62	52.42
T_3 –25 November	276.40	8.79	43.80	43.80	42.06	48.76
T_4–5 December	235.00	8.25	40.20	41.50	33.40	45.62
LSD (P=0.05)	22.97	0.37	2.98	0.91	2.32	2.85

Sowing of wheat at 5th November produce significantly maximum grain yield (44.64 q/ha) being at par with15th November both were significantly more over 25th November and 5th December. Early sowing of wheat at 5th November and 15th November produced significantly 6.13%, 3.70% more grain yield over 25th November and 33.65% and 30.59% more grain yield over 5th December, respectively. Straw yield (52.90q/ha) recorded maximum with5th November being at par with 15th November both were significantly more over 25th November and 5th December. Sowing of wheat at 5th November and 15th November produces 8.49%, 7.51% more straw yield over 25th November and 15.96% and14.91% more straw yield over 5th December, respectively(Table1).Similar findings was also reported byDwivedi*et al*. 2015.

The benefit accrued was more in wheat sowing at 5th November and statically at par with 15th November over 25th November and 5th December.Net return (Rs 39228/ha) recorded significantly higher with 5th November and statically at par with 15th November over 25th November and 5th December. The B-C ratio also recorded significantly higher with 5thNovember and statically at par with 15th November over 25th November and 5th December. The higher returns by 6.13 and 3.71% & by 33.65% &30.60%, respectively were recorded when wheat sown at 5th November and 15th November than 25th November and 5th December(Table 2).

Table2: Effect of date of sowing on economics on wheat (Pooled data of two years)

Treatment	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	B:C Ratio
T_1- 5 November	25500	64,728	39,228	2.54
T_2 –15 November	25500	63,249	37,749	2.48
T_3 –25 November	25500	60,987	35,487	2.39
T_4–5 December	25500	48,430	22,930	1.90
LSD (P=0.05)	-	3,367	3,367	0.13

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